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July 30, 2020

Pre-Remedial Design Investigation Summary Report Addendum No. 1

1 Introduction

The *Pre-Remedial Design Investigation Summary Report* (PDI Summary Report; Anchor QEA 2020) was prepared by Anchor QEA, LLC, on behalf of the Port of Portland (Port) for the Terminal 4 (T4) Action Area (as defined in the Administrative Settlement Agreement and Order on Consent [ASAOC] for Remedial Design [RD] for T4), which is located on the east bank of the Willamette River between river miles 4.2 and 5.0 in Portland, Oregon. The PDI Summary Report was submitted on June 26, 2020, to the U.S. Environmental Protection Agency (USEPA). This PDI Summary Report Addendum No. 1 has been prepared under the ASAOC (Docket No. Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] 10 2004-0009), as amended on June 21, 2018, and in the *Remedial Design Statement of Work* (SOW; USEPA 2018).

At the request of USEPA, the Port performed dioxin/furan (D/F) testing of five archived subsurface sediment samples from three underpier PDI core locations in Slip 3: SC24, SC25, and SC26. The results of the supplemental testing are provided in this PDI Summary Report Addendum No. 1. The additional D/F data are intended to supplement existing data (i.e., for polycyclic aromatic hydrocarbons [PAHs] and polychlorinated biphenyls [PCBs]) at these locations and support sediment management area (SMA) delineation and RD.

2 Summary of Additional Dioxin/Furan Subsurface Sediment Testing Results

D/Fs were analyzed in five subsurface samples from the following three underpier core locations in Slip 3: SC24 (1 to 2 feet and 2 to 2.2 feet), SC25 (1 to 2 feet and 2 to 2.2 feet), and SC26 (1 to 2 feet). Sample locations are presented in Figures 5-4a to 5-4e, which have been updated with the additional D/F data to replace Figures 5-4a to 5-4e in the PDI Summary Report. The core intervals for the additional five samples discussed in this addendum are bolded in the figures for ease of review. Sample results are provided in a new Table 1.

D/Fs were detected in all five samples, with three samples having detected concentrations exceeding a D/F remedial action level (RAL). No samples exceeded D/F principal threat waste (PTW) thresholds. The following is a summary of the results by congener for each D/F with a RAL or PTW threshold:

- 1,2,3,7,8-pentachlorodibenzo-p-dioxin (PeCDD): Samples from SC25 (2 to 2.2 feet; 0.000977 micrograms per kilogram [µg/kg]) and SC26 (1 to 2 feet; 0.00183 µg/kg) exceed the PeCDD RAL of 0.0008 µg/kg.

- 2,3,4,7,8-pentachlorodibenzofuran (PeCDF): No samples exceed the PeCDF RAL or PTW threshold (0.2 µg/kg).
- 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD): One sample from SC24 (2 to 2.2 feet; 0.000760 µg/kg) exceeds the TCDD RAL of 0.0006 µg/kg.
- 1,2,3,4,7,8-hexachlorodibenzofuran (HxCDF): No samples exceed the HxCDF PTW threshold of 0.04 µg/kg.
- 2,3,7,8-tetrachlorodibenzofuran (TCDF): No samples exceed the TCDF PTW threshold of 0.6 µg/kg.

The three D/F RAL exceedances noted above are in core intervals that coincide with total PAH RAL exceedances in the Slip 3 underpier area.

3 Chemical Data Quality

Laboratory and field quality control procedures that were followed to ensure data are of known and acceptable precision and accuracy so project objectives are achieved were detailed in Section 3 of the PDI Summary Report except as noted in the following section.

3.1 Data Validation

All chemical data submitted in this addendum were validated by Anchor QEA, LLC. A Stage 2B data validation was performed (USEPA 2009). The data validation report is provided in Attachment A. The data validation was performed under USEPA guidelines, as described in the *Sampling Quality Assurance Project Plan* (Anchor QEA 2019, Appendix A) and the *National Functional Guidelines for High Resolution Superfund Methods Data Review* (USEPA 2016).

Data validation verified the accuracy and precision of D/F data collected during this investigation. Data qualifiers assigned as a result of the data validation and their definitions are shown on the analytical results table (Table 1). Data may have been qualified as biased or estimated for an analysis based on method or technical criteria. Data qualified with a "J" indicate that the associated numerical value is an estimated concentration of the analyte. Data qualified with a "UJ" indicate the estimated reporting limit (RL) below which the analyte was not detected. All data were determined to be useable as reported from the laboratory or as qualified in the validation report. No data were rejected as a result of validation, and data completeness was 100%.

Approximately 25% of the D/F results presented in this addendum were flagged as an estimated maximum possible concentration (EMPC) by the laboratory. The EMPC qualifier is applied to a result when a peak is detected but did not meet all the method criteria. In other words, the instrument detected a peak that is similar to the target compound but did not meet all of the method criteria to be identified as that compound. However, if it is that compound, the reported result is the maximum possible concentration it could be. During validation, all EMPC qualified data were qualified "J" to

indicate detected concentrations are estimated, using USEPA national validation guidance (USEPA 2016).

One TCDD result was slightly above the RAL at 0.00076 µg/kg in the 2- to 2.2-foot interval at location SC24. PeCDD exceeded the RAL in the 2- to 2.2-foot interval of location SC25 and the 1- to 2-foot interval at location SC26. The SC25 sample result was detected above the estimated detection limit (EDL) and below the RL and qualified as estimated because it is below the RL, which is the lowest concentration that can be quantified within certain limits of accuracy and precision. Overall, 14% of the data were qualified "J" by the laboratory to indicate an estimated, low-level detection below the RL. The SC26 sample result was EMPC-qualified and is also considered estimated.

The 2- to 2.2-foot interval of location SC24 and the 2- to 2.2-foot interval of location SC25 exceeded the TCDD cleanup level (CUL) value, and the exceedance factors are 3.8 and 2.5, respectively. These results are both qualified "J" to indicate they are estimated values. The 1- to 2-foot intervals collected from locations SC24, SC25, and SC26 and the 2- to 2.2-foot interval from location SC25 exceeded the PeCDD CUL value. Exceedance factors ranged from 1.4 to 9.1. All five sample results exceeded CUL values for TCDF, PeCDF, and HxCDF. Thirteen of the 21 results that exceeded the CUL values were qualified "J" to indicate they are estimated due to results between the EDL and the RL, EMPC qualifiers, or due to internal standard recoveries outside of control limits.

Some D/F EDLs were elevated due to matrix interference, which the laboratory was unable to resolve due to high concentrations of non-target analytes. No D/F EDLs were above RALs.

Samples in which a non-detected concentration reported at the EDL exceeded a CUL include the following:

- The non-detected concentration reported at the EDL for TCDD was above the CUL in the 1- to 2-foot interval collected from locations SC24 and SC26. The CUL exceedance factors are 2.3 and 1.6, respectively.
- The non-detected concentration reported at the EDL for PeCDD was above the CUL in the 2- to 2.2-foot interval from location SC24, with a CUL exceedance factor of approximately 2.

4 References

Anchor QEA (Anchor QEA, LLC), 2019. *Pre-Remedial Design Investigation Work Plan*. Terminal 4 Remedy. Prepared for the U.S. Environmental Protection Agency on behalf of the Port of Portland. March 8, 2019.

Anchor QEA, 2020. *Pre-Remedial Design Investigation Summary Report*. Terminal 4 Remedy. Prepared for the U.S. Environmental Protection Agency on behalf of the Port of Portland. June 26, 2020.

USEPA (U.S. Environmental Protection Agency), 2009. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use*. U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response. EPA 540-R-08-005. January 13, 2009.

USEPA, 2016. *National Functional Guidelines for High Resolution Superfund Methods Data Review*. Office of Superfund Remediation and Technology Innovation (OSRTI). EPA-542-B-16-001. April 2016.

USEPA, 2018. *Remedial Design Statement of Work, Portland Harbor Superfund Site*. Terminal 4 Action Area, Portland, Multnomah County, Oregon. June 2018.

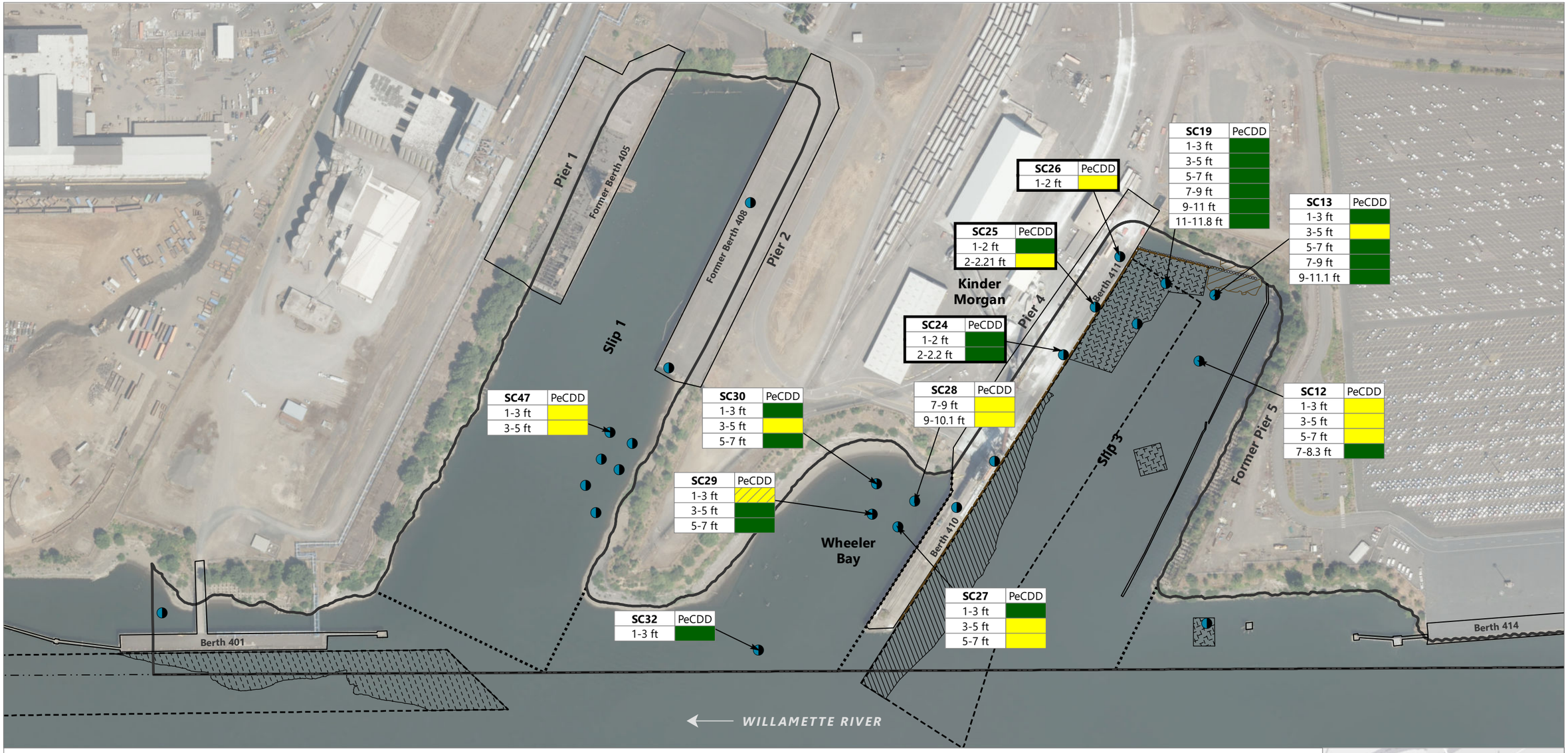
Table

Table 1
Subsurface Sediment Data: Underpier Slip 3 Dioxins/Furans

			SubArea	Slip 3	Slip 3	Slip 3	Slip 3	Slip 3
			Location ID	T4-PDI2019-SC24	T4-PDI2019-SC24	T4-PDI2019-SC25	T4-PDI2019-SC25	T4-PDI2019-SC26
			Abbreviated Location ID	SC24	SC24	SC25	SC25	SC26
			Sample ID	T4-PDI2019-SC24-190529-01-02	T4-PDI2019-SC24-190529-02-2.2	T4-PDI2019-SC25-190529-01-02	T4-PDI2019-SC25-190529-02-2.21	T4-PDI2019-SC26-190530-01-02
			Depth	1 - 2 ft	2 - 2.2 ft	1 - 2 ft	2 - 2.2 ft	1 - 2 ft
			Sample Date	5/29/2019	5/29/2019	5/29/2019	5/29/2019	5/30/2019
	RAL	PTW						
Dioxin Furans (µg/kg)								
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.0006	0.01	0.000467 U	**0.000760 J**	0.000165 U	**0.000505 J**	0.000318 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.0008	0.01	**0.000529 J**	0.000395 U	**0.000279 J**	**0.000977 J**	**0.00183 J**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)			**0.000681 J**	**0.00305 J**	0.000347 U	**0.00192 J**	**0.00373 J**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)			**0.00468**	**0.0170 J**	**0.00226 J**	**0.0112**	**0.0170 J**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)			**0.00174 J**	**0.00752 J**	**0.00112 J**	**0.00456 J**	**0.00719 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)			**0.0891**	**0.394 J**	**0.0805**	**0.353 J**	**0.527 J**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)			**0.933**	**4.01 J**	**0.693**	**4.04**	**4.92 J**
Total Tetrachlorodibenzo-p-dioxin (TCDD)			**0.00140 J**	**0.00885 J**	**0.00192**	**0.00776 J**	**0.00501 J**
Total Pentachlorodibenzo-p-dioxin (PeCDD)			**0.00268 J**	**0.0154 J**	**0.00295 J**	**0.0151 J**	**0.0180 J**
Total Hexachlorodibenzo-p-dioxin (HxCDD)			**0.0380 J**	**0.168 J**	**0.032**	**0.142 J**	**0.217 J**
Total Heptachlorodibenzo-p-dioxin (HpCDD)			**0.224**	**0.944 J**	**0.287**	**1.12 J**	**1.64 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)		0.6	**0.00112**	**0.00539 J**	**0.000646**	**0.00198**	**0.00299**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)			**0.000654 J**	**0.00365**	**0.000615 J**	**0.00249**	**0.00277**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.2	0.2	**0.000673 J**	**0.00403**	**0.000693 J**	**0.00254**	**0.00267**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)		0.04	**0.00220 J**	**0.00857 J**	**0.00205 J**	**0.00808**	**0.0142 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)			**0.000777 J**	**0.00331 J**	**0.000675 J**	**0.00226 J**	**0.00442 J**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)			0.000680 U	**0.000677 J**	**0.000359 J**	**0.00119 J**	0.00201 UJ
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)			**0.00106 J**	**0.00345 J**	**0.000659 J**	**0.00219 J**	**0.00439 J**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)			**0.0115**	**0.0411 J**	**0.00869**	**0.0275 J**	**0.0480 J**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)			0.000992 U	**0.00299 J**	**0.000829 J**	0.00160 UJ	**0.00477 J**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)			**0.0328**	**0.0674 J**	**0.0255**	**0.0709**	**0.103 J**
Total Tetrachlorodibenzofuran (TCDF)			**0.00541**	**0.0369 J**	**0.00558 J**	**0.0175**	**0.0236 J**
Total Pentachlorodibenzofuran (PeCDF)			**0.00988 J**	**0.0537 J**	**0.00862 J**	**0.0333**	**0.0487 J**
Total Hexachlorodibenzofuran (HxCDF)			**0.0253 J**	**0.0972 J**	**0.0196**	**0.0662 J**	**0.126 J**
Total Heptachlorodibenzofuran (HpCDF)			0.0436	0.138 J	0.0393 J	0.104 J	0.18 J

Notes:
Detected concentration is greater than the RAL
Bold: Detected result
J: Estimated value
U: Compound analyzed but not detected above detection limit
UJ: Compound analyzed but not detected above estimated detection limit
µg/kg: micrograms per kilogram
ft: feet
PTW: principal threat waste
RAL: remedial action level

Figures



LEGEND:

- Sediment Decision Unit RM 4.5E
- Navigation Channel
- Shoreline Structures
- Sheet Pile Wall
- Timber Pinch Pile
- Site Subarea Boundaries
- Potential Maintenance Dredging
- Early Action Sediment Cap
- Berth 410 Maintenance Dredging (2017)
- Berth 401 Maintenance Dredging (2015)
- Terminal 4 Early Action Dredging (2008)
- PDI 2019 Subsurface Sediment Sampling Locations

Abbreviated Core ID → SC12 PeCDD
Depth Interval → 1-3 ft
3-5 ft
5-7 ft
7-9 ft

- Exceeds PTW-Highly Toxic
- Exceeds RAL (Detect)
- Exceeds RAL (Non-Detect)
- Does Not Exceed

Locations with Triggered D/F Analysis

NOTES:
1. Arrow indicates direction of flow of river.
2. Horizontal datum is NAD83 (HARN 1991) Oregon State Plane North, International Feet.
3. Aerial imagery from City of Portland 2018.
4. SDU boundary extends approximately 1,000 feet upstream from the extent shown.

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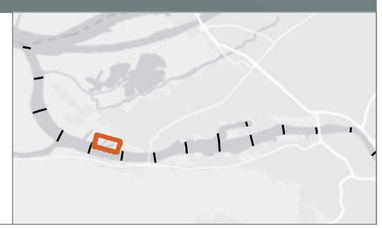
Feet



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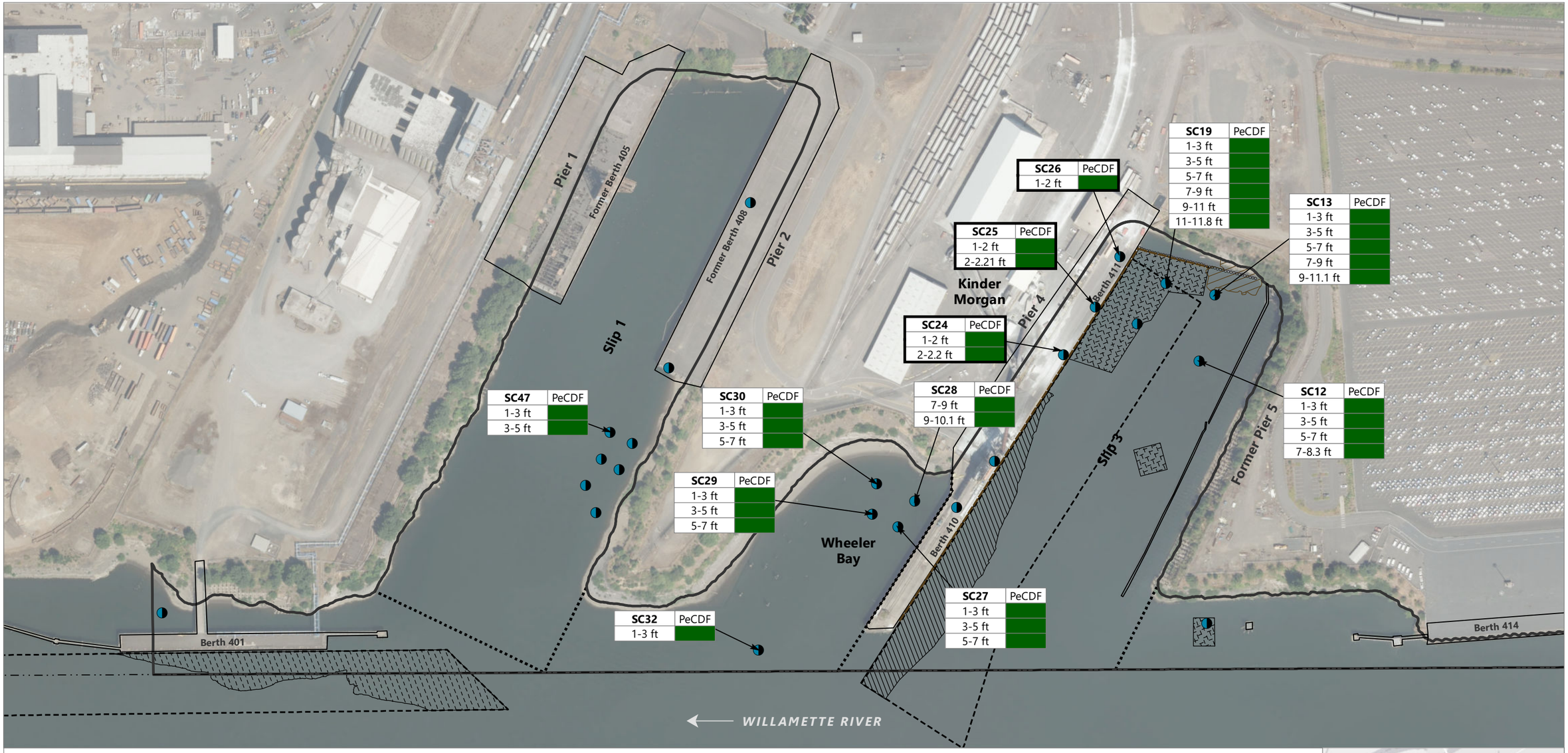
ANCHOR QEA

Figure 5-4a
Subsurface Sediment Concentrations – 1,2,3,7,8-PeCDD
Pre-Remedial Design Investigation Summary Report
Terminal 4 Remedy



LEGEND:

- Sediment Decision Unit RM 4.5E
- Navigation Channel
- Shoreline Structures
- Sheet Pile Wall
- Timber Pinch Pile
- Site Subarea Boundaries
- Potential Maintenance Dredging
- Early Action Sediment Cap
- Berth 410 Maintenance Dredging (2017)
- Berth 401 Maintenance Dredging (2015)
- Terminal 4 Early Action Dredging (2008)
- PDI 2019 Subsurface Sediment Sampling Locations

Abbreviated Core ID → SC12 PeCDF
Depth Interval → 1-3 ft / 3-5 ft / 5-7 ft / 7-9 ft

- Exceeds PTW-Highly Toxic
- Exceeds RAL (Detect)
- Exceeds RAL (Non-Detect)
- Does Not Exceed

Locations with Triggered D/F Analysis

NOTES:
1. Arrow indicates direction of flow of river.
2. Horizontal datum is NAD83 (HARN 1991) Oregon State Plane North, International Feet.
3. Aerial imagery from City of Portland 2018.
4. SDU boundary extends approximately 1,000 feet upstream from the extent shown.

0 250
Feet

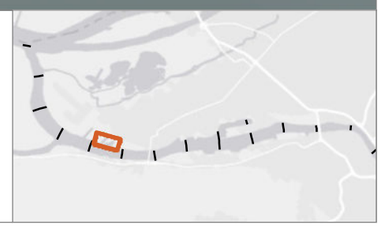


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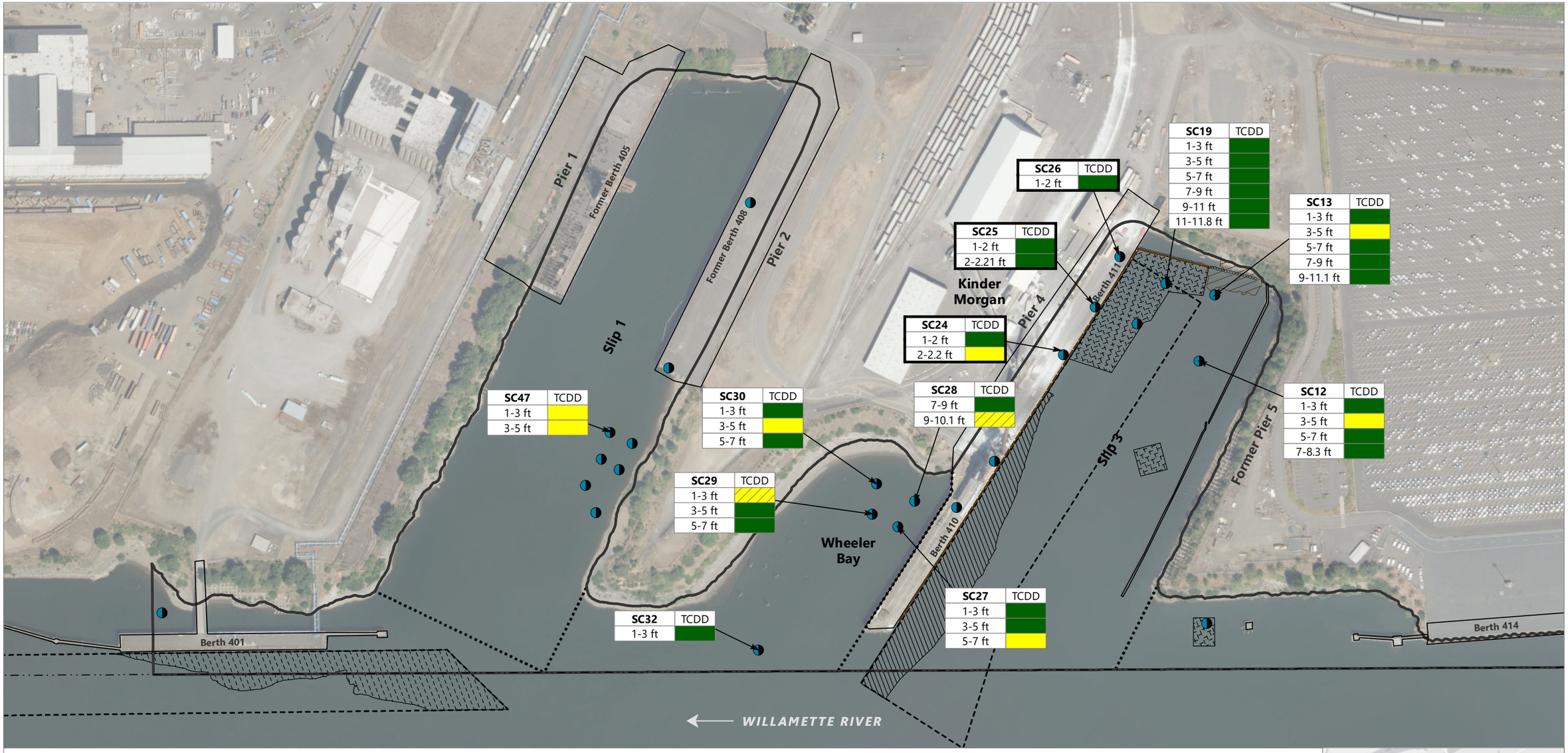
Figure 5-4b
Subsurface Sediment Concentrations – 2,3,4,7,8-PeCDF
Pre-Remedial Design Investigation Summary Report
Terminal 4 Remedy



LEGEND:

- Sediment Decision Unit RM 4.5E
- Navigation Channel
- Shoreline Structures
- Sheet Pile Wall
- Timber Pinch Pile
- Site Subarea Boundaries
- Potential Maintenance Dredging
- Early Action Sediment Cap
- Berth 410 Maintenance Dredging (2017)
- Berth 401 Maintenance Dredging (2015)
- Terminal 4 Early Action Dredging (2008)
- PDI 2019 Subsurface Sediment Sampling Locations

Abbreviated Core ID → SC12 TCDD
Depth Interval → 1-3 ft

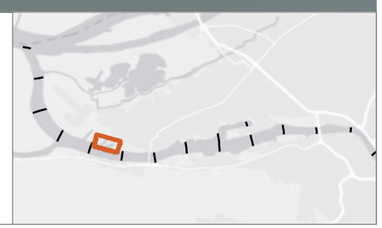
- Exceeds PTW-Highly Toxic
- Exceeds RAL (Detect)
- Exceeds RAL (Non-Detect)
- Does Not Exceed

3-5 ft
5-7 ft
7-9 ft

Locations with Triggered D/F Analysis

NOTES:
1. Arrow indicates direction of flow of river.
2. Horizontal datum is NAD83 (HARN 1991) Oregon State Plane North, International Feet.
3. Aerial imagery from City of Portland 2018.
4. SDU boundary extends approximately 1,000 feet upstream from the extent shown.

0 250
Feet



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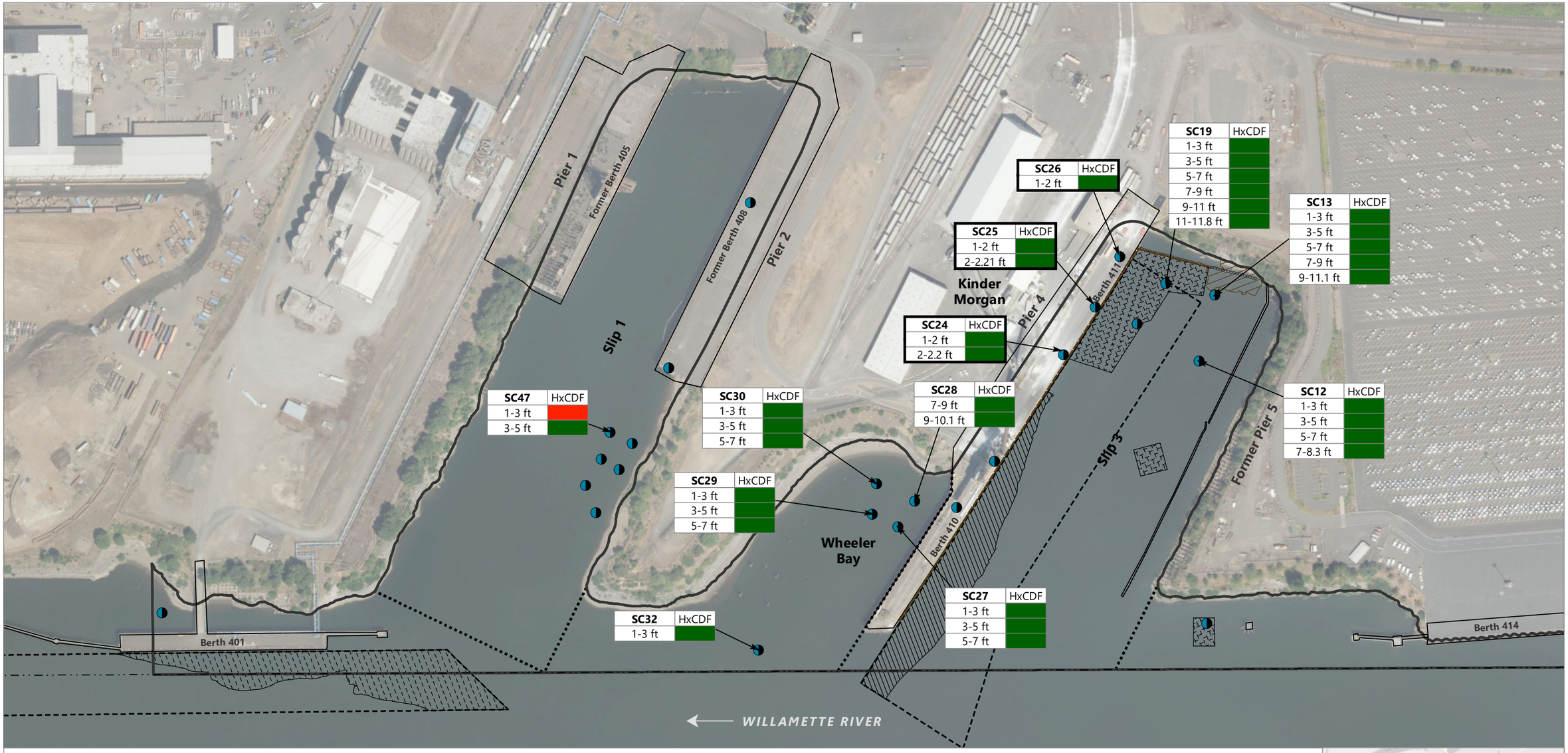
ANCHOR QEA

Figure 5-4c
Subsurface Sediment Concentrations – 2,3,7,8-TCDD
Pre-Remedial Design Investigation Summary Report
Terminal 4 Remedy



LEGEND:

- Sediment Decision Unit RM 4.5E
- Navigation Channel
- Shoreline Structures
- Sheet Pile Wall
- Timber Pinch Pile
- Site Subarea Boundaries
- Potential Maintenance Dredging
- Early Action Sediment Cap
- Berth 410 Maintenance Dredging (2017)
- Berth 401 Maintenance Dredging (2015)
- Terminal 4 Early Action Dredging (2008)
- PDI 2019 Subsurface Sediment Sampling Locations

Abbreviated Core ID → SC12 HxCDF
Depth Interval → 1-3 ft
3-5 ft
5-7 ft

- Exceeds PTW-Highly Toxic (Detect)
- Exceeds PTW-Highly Toxic (Non-Detect)
- Does Not Exceed
- Locations with Triggered D/F Analysis

NOTES:
1. Arrow indicates direction of flow of river.
2. Horizontal datum is NAD83 (HARN 1991) Oregon State Plane North, International Feet.
3. Aerial imagery from City of Portland 2018.
4. SDU boundary extends approximately 1,000 feet upstream from the extent shown.

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Feet

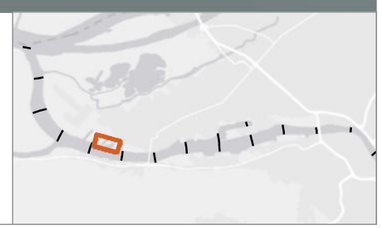

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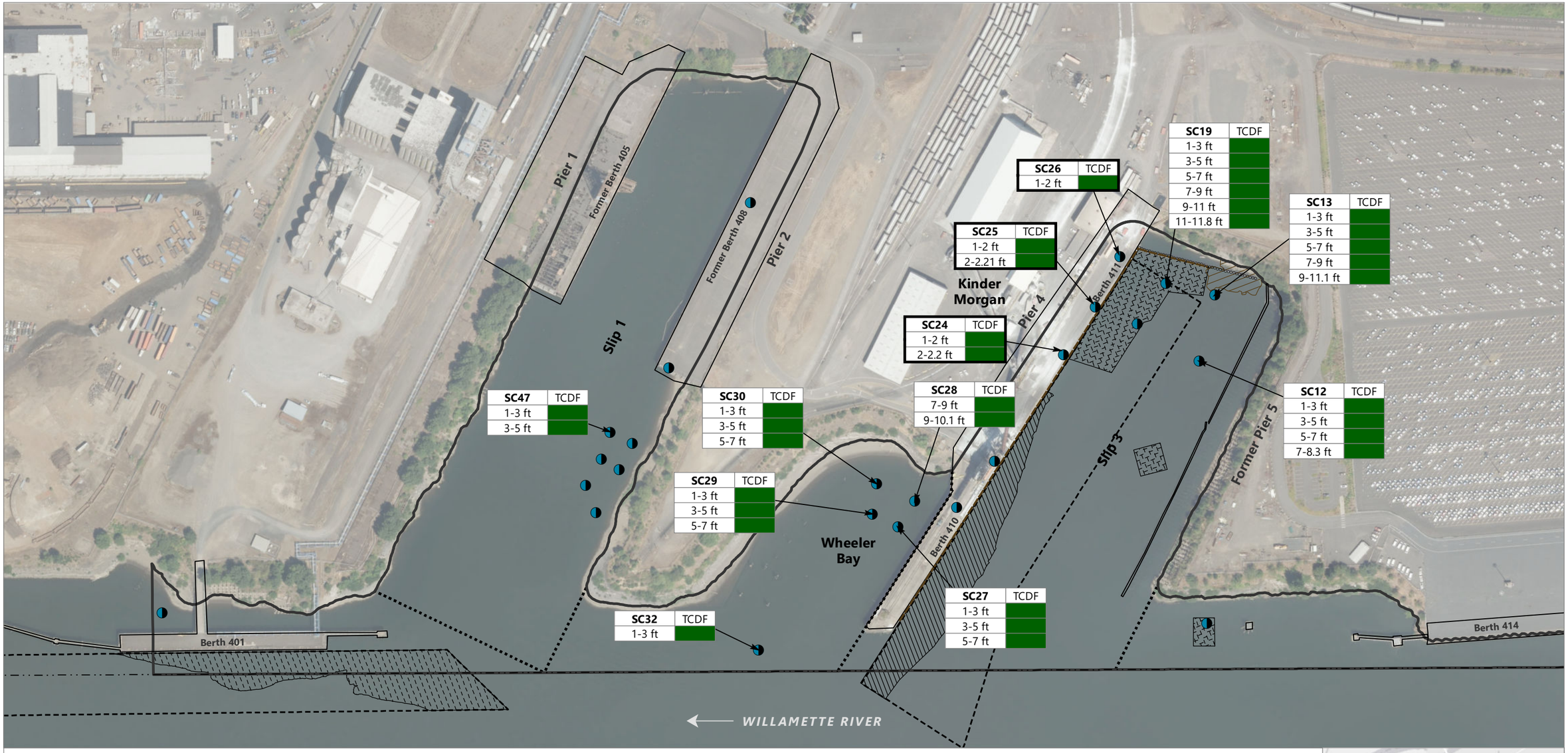
Figure 5-4d
Subsurface Sediment Concentrations – 1,2,3,4,7,8-HxCDF
Pre-Remedial Design Investigation Summary Report
Terminal 4 Remedy



LEGEND:

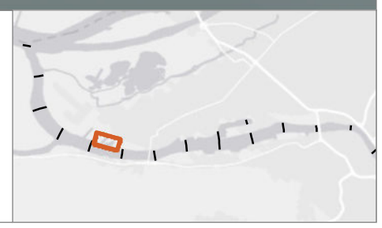
- Sediment Decision Unit RM 4.5E
- Navigation Channel
- Shoreline Structures
- Sheet Pile Wall
- Timber Pinch Pile
- Site Subarea Boundaries
- Potential Maintenance Dredging
- Early Action Sediment Cap
- Berth 410 Maintenance Dredging (2017)
- Berth 401 Maintenance Dredging (2015)
- Terminal 4 Early Action Dredging (2008)
- PDI 2019 Subsurface Sediment Sampling Locations

Abbreviated Core ID → SC12 TCDF
Depth Interval → 1-3 ft / 3-5 ft / 5-7 ft

- Exceeds PTW-Highly Toxic (Detect)
- Exceeds PTW-Highly Toxic (Non-Detect)
- Does Not Exceed
- Locations with Triggered D/F Analysis

NOTES:
1. Arrow indicates direction of flow of river.
2. Horizontal datum is NAD83 (HARN 1991) Oregon State Plane North, International Feet.
3. Aerial imagery from City of Portland 2018.
4. SDU boundary extends approximately 1,000 feet upstream from the extent shown.

0 250
Feet



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ANCHOR QEA

Figure 5-4e
Subsurface Sediment Concentrations – 2,3,7,8-TCDF
Pre-Remedial Design Investigation Summary Report
Terminal 4 Remedy

Attachment A
Data Validation Report

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ANCHOR QEA

Data Validation Report – USEPA Stage 2B

July 6, 2020

Project: Port of Portland Terminal 4 Pre-Remedial Design Investigation

Project Number: 190332-01.06

This report summarizes the review of analytical results for five sediment samples collected on May 29 and 30, 2019. The samples were collected by Anchor QEA, LLC, and submitted to Vista Analytical (Vista) in Sacramento, California. Dioxin/furan data analyzed by U.S. Environmental Protection Agency (USEPA) method 1613B were reviewed in this report.

Vista sample delivery group number 2001194 was reviewed in this report. Sample IDs are presented in Table 1.

Table 1
Sample IDs

Sample ID	Laboratory Sample ID
T4-PDI2019-SC24-190529-01-02	2001194-01
T4-PDI2019-SC24-190529-02-2.2	2001194-02
T4-PDI2019-SC25-190529-01-02	2001194-03
T4-PDI2019-SC25-190529-02-2.21	2001194-04
T4-PDI2019-SC26-190530-01-02	2001194-05

Data Validation and Qualifications

The following comments refer to the laboratory's performance in meeting the quality assurance/quality control (QA/QC) guidelines outlined in the analytical procedures. Laboratory results were reviewed using the following guidelines:

- Terminal 4 *Sampling Quality Assurance Project Plan* (Anchor QEA 2019, Appendix A)
- USEPA's *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (USEPA 1986)
- USEPA's *National Functional Guidelines for High Resolution Superfund Methods Data Review* (USEPA 2016)

Unless noted in this report, laboratory results for the samples listed above were within QC criteria.

Field Documentation

Field documentation was checked for completeness and accuracy. The chain-of-custody forms were signed by Vista at the time of sample receipt. Samples were received in good condition and within the recommended temperature range.

Sample Preservation and Holding Times

Samples were appropriately preserved and analyzed within project-required holding times.

Laboratory Method Blanks

Laboratory method blanks were analyzed at the required frequency. Blanks were free of target analytes except for 1,2,3,7,8,9-hexachlorodibenzofuran (HxCDF) and total HxCDF in one of the two method blanks reported. Associated sample results were significantly greater than (greater than five times) the levels detected in the method blank, so no data were qualified.

Field Quality Control

No field quality control samples were submitted with these sample sets.

Instrument Performance Checks

Instrument performance was checked at the required frequency and met method criteria.

Initial Calibrations and Calibration Verifications

Initial calibrations and calibration verifications were performed as required by the method and met method criteria.

Labeled Compound Recoveries

Labeled compounds were added to all samples and recovered within established criteria with the exceptions of between 7 and 14 labeled compounds in the analyses of three samples. The labeled compounds recovered below control limits and associated sample results have been qualified “J” or “UJ” to indicate a potentially low bias. See Table 2 for qualified data.

Ongoing Precision and Recovery

Ongoing precision and recovery (OPR) samples were analyzed at the required frequency and resulted in recoveries within project-specified control limits.

Matrix Spike and Matrix Spike Duplicate Samples

Matrix spike and matrix spike duplicate samples are not required for isotope dilution methods.

Laboratory Duplicates

A laboratory duplicate was analyzed at the required frequency. Results that were less than five times the reporting limit were evaluated by the difference between them. Duplicate relative percent difference (RPD) or difference values were within project-required control limits.

Confirmatory Analyses

All detected 2,3,7,8-tetrachlorodibenzofuran (TCDF) results were confirmed by separate and different column analyses.

Estimated Maximum Possible Concentration

Some sample results did not meet ion abundance criteria and were qualified as estimated maximum possible concentration (EMPC). These results have been qualified "J" to indicate they are estimated.

Method Reporting Limits

Reporting limits were acceptable as reported. All values were reported using the laboratory reporting limits. Values were reported as undiluted, or when diluted, the reporting limit reflects the dilution factor.

Overall Assessment

As was determined by this evaluation, the laboratory followed the specified analytical methods, and all requested sample analyses were completed. Accuracy was acceptable as demonstrated by the calibration, labeled standard, and OPR values, with the exceptions previously noted. Precision was acceptable as demonstrated by the laboratory duplicate RPD or difference values. All data are acceptable as reported or as qualified. Table 2 summarizes the qualifiers applied to the sample results reviewed in this report.

Data Qualifier Definitions

U Indicates the compound or analyte was analyzed for but not detected at or above the specified limit

J Indicates an estimated value

UJ Indicates the compound or analyte was analyzed for but not detected and the specified limit reported is estimated

Table 2
Data Qualification Summary

Sample ID	Analyte	Reported Result (ng/kg)	Qualified Result (ng/kg)	Reason
T4-PDI2019-SC24-190529-01-02	1,2,3,4,7,8-HxCDD	0.681EMPC	0.681J	EMPC
	1,2,3,6,7,8-HxCDF	0.777EMPC	0.777J	
	1,2,3,7,8-PeCDD	0.529EMPC	0.529J	
	1,2,3,7,8-PeCDF	0.654EMPC	0.654J	
	Total HxCDD	38EMPC	38J	
	Total HxCDF	25.3EMPC	25.3J	
	Total PeCDD	2.68EMPC	2.68J	
	Total PeCDF	9.88EMPC	9.88J	
	Total TCDD	1.4EMPC	1.4J	
T4-PDI2019-SC24-190529-02-2.2	1,2,3,4,6,7,8-HpCDD	394	394J	Labeled compound %R below control limit
	1,2,3,4,6,7,8-HpCDF	41.1	41.1J	
	1,2,3,4,7,8,9-HpCDF	2.99	2.99J	
	1,2,3,4,7,8-HxCDD	3.05	3.05J	
	1,2,3,4,7,8-HxCDF	8.57	8.57J	
	1,2,3,6,7,8-HxCDD	17	17J	
	1,2,3,6,7,8-HxCDF	3.31	3.31J	
	1,2,3,7,8,9-HxCDD	7.52	7.52J	
	1,2,3,7,8,9-HxCDF	0.677J	0.677J	
	2,3,4,6,7,8-HxCDF	3.45	3.45J	
	2,3,7,8-TCDD	0.76	0.76J	
	2,3,7,8-TCDF	5.39	5.39J	
	OCDD	4010	4010J	
	OCDF	67.4	67.4J	
	Total HpCDD	944	944J	
	Total HpCDF	138	138J	
	Total HxCDD	168	168J	
	Total PeCDF	53.7	53.7J	
	Total HxCDF	97.2EMPC	97.2J	Labeled compound %R below control limit, EMPC
	Total PeCDD	15.4EMPC	15.4J	
	Total TCDD	8.85EMPC	8.85J	
	Total TCDF	36.9EMPC	36.9J	
T4-PDI2019-SC25-190529-01-02	1,2,3,4,7,8,9-HpCDF	0.829EMPC	0.829J	EMPC
	1,2,3,7,8-PeCDD	0.279EMPC	0.279J	
	2,3,4,7,8-PeCDF	0.693EMPC	0.693J	
	Total HpCDF	39.3EMPC	39.3J	
	Total PeCDD	2.95EMPC	2.95J	
	Total PeCDF	8.62EMPC	8.62J	
	Total TCDF	5.58EMPC	5.58J	

Sample ID	Analyte	Reported Result (ng/kg)	Qualified Result (ng/kg)	Reason
T4-PDI2019-SC25-190529-02-2.21	1,2,3,4,6,7,8-HpCDD	353	353J	Labeled compound %R below control limit
	1,2,3,4,6,7,8-HpCDF	27.5	27.5J	
	1,2,3,4,7,8,9-HpCDF	1.6U	1.6UJ	
	1,2,3,4,7,8-HxCDD	1.92J	1.92J	
	1,2,3,7,8,9-HxCDD	4.56	4.56J	
	1,2,3,7,8,9-HxCDF	1.19J	1.19J	
	2,3,4,6,7,8-HxCDF	2.19J	2.19J	
	Total HpCDD	1120	1120J	
	Total HpCDF	104	104J	
	Total HxCDD	142	142J	
	Total HxCDF	66.2	66.2J	
	2,3,7,8-TCDD	0.505EMPC	0.505J	EMPC
	Total PeCDD	15.1EMPC	15.1J	
	Total TCDD	7.76EMPC	7.76J	
T4-PDI2019-SC26-190530-01-02	1,2,3,4,6,7,8-HpCDD	527	527J	Labeled compound %R below control limit
	1,2,3,4,6,7,8-HpCDF	48	48J	
	1,2,3,4,7,8-HxCDD	3.73	3.73J	
	1,2,3,4,7,8-HxCDF	14.2	14.2J	
	1,2,3,6,7,8-HxCDD	17	17J	
	1,2,3,6,7,8-HxCDF	4.42	4.42J	
	1,2,3,7,8,9-HxCDD	7.19	7.19J	
	1,2,3,7,8,9-HxCDF	2.01U	2.01UJ	
	2,3,4,6,7,8-HxCDF	4.39	4.39J	
	OCDD	4920	4920J	
	OCDF	103	103J	
	Total HpCDD	1640	1640J	
	Total HxCDF	126	126J	
	1,2,3,4,7,8,9-HpCDF	4.77EMPC	4.77J	Labeled compound %R below control limit, EMPC
	Total HpCDF	180EMPC	180J	
	Total HxCDD	217EMPC	217J	
	1,2,3,7,8-PeCDD	1.83EMPC	1.83J	EMPC
	Total PeCDD	18EMPC	18J	
	Total PeCDF	48.7EMPC	48.7J	
	Total TCDD	5.01EMPC	5.01J	
	Total TCDF	23.6EMPC	23.6J	

Notes:
%R: percent recovery
ng/kg: nanogram per kilogram

References

Anchor QEA (Anchor QEA, LLC), 2019. *Pre-Remedial Design Investigation Work Plan*. Terminal 4 Remedy. Prepared for the U.S. Environmental Protection Agency on behalf of the Port of Portland. March 8, 2019.

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